

Is the remittance inflow to the Turkish economy resilient? A glimpse of the future through the lens of the past.

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Abstract. *The impact of global remittance inflows on numerous macro- and microeconomic parameters has long piqued the interest of researchers, policymakers, and academics. Remittances have always been vital to Turkey's development as a remittance recipient country. However, this trend has recently changed. Turkey is currently receiving significantly less remittance, and this reduction in remittance is well noted in its economic performance. With declining economic growth, rising inflation, and a depreciating value of the Turkish Lira, economists and researchers are looking for measures to overcome these snags. This study is an endeavor to examine whether Turkey's remittance inflows will increase in the future or if their decline will continue. A time series dataset for the period of 1974-2021 has been considered for analysis, and an auto-regressive integrated moving average (ARIMA) approach was applied to forecast remittance inflow for the next nine years until 2030. According to the study's findings, remittance inflows to Turkey would fall to -1.02 percent of GDP in 2030, down from 3.99 percent in 1974. The finding of the study will help economic and financial policymakers to devise the policies related to foreign funds in advance so that unwanted consequences of limited remittance inflows can be avoided.*

Keywords: Remittances, Turkey, ARIMA, Forecasting, Economic development.

JEL Codes: F24, F63, C53

1. Introduction

Remittances are funds that migrants primarily send back to their home countries. (World Bank, 2022b). The dream of earning a good salary, having a good life, and providing the best possible support to family members are some of the reasons that motivate people to migrate from one country to another. Foreign remittances have recently surpassed foreign direct investment and overseas development assistance as the most important source of foreign funds for developing countries (Stephen, 2021). Given the importance of remittance inflows, researchers and economists have been drawn to investigate the impact of remittance inflows on various macro- and microeconomic growth variables. Previous studies observed that remittance inflows affect economic growth, poverty, financial development, inflation, exports, and the currency rate (Azizi, 2020; Basnet et al., 2022; Oleksiv and Mirzoieva, 2022). The interesting fact that came out of the majority of studies was that remittance inflows have a positive effect on these variables. Especially in the case of developing economies, the impact of remittances was found to be significant in most of the cases (Abduvaliev and Bustillo, 2019; Cazachevici et al., 2020). In contrast to this there are few studies that has confirmed that remittance inflows do not significantly affect the macroeconomic factors (Khan and Gunwant, 2023). It was also observed that declining remittance inflows impacted developing economies.

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One such developing country is Turkey, which used to get a fair share of international remittances. Remittance receipts used to represent 3.99 percent of Turkish GDP in 1974, which was equivalent to 1.42 billion US dollars. However, by the end of the year 2020, remittance receipts to Turkey had declined to a level of 0.11 percent of GDP, equivalent to 795 million dollars (World Bank, 2022a). This decline in remittance inflow had been attributed to many factors, including the massive earthquake in 1999, which decreased the remittance inflows by highlighting the fact that financial motivation was the major remittance driving force rather than altruism (Aydas et al., 2014a). Another reason was the increase in household income which caused a decrease in remittance inflows (Hunte, 2016).

Although these were the reasons for the decline in remittances at various points in time. Past studies that have included remittance inflows and have been done in the context of Turkey show very exciting findings. In one such study, Bayar, (2017) has found that remittance inflows to Turkey help in enhancing portfolio investments and FDI inflows to the economy. In another study of Turkish economy, it has been found out that remittance inflows helped in improving the real GDP of the country (Sayan and Tekin-Koru, 2012). On the front of poverty, in a panel data-based study it has been found that a 10 percent increase in remittance cause a decline of 5.3 percent in poverty levels for those who live below USD 2 per day (Ciupureanu and Roman, 2016). Aysit and Pinar, (2010) have analysed the dynamic multiplier effect of remittance inflows on consumption, imports, and income of the country. They found out that remittance positively affect all these factors. In a Turkish international migration survey-based study by Koc and Onan, (2018), it has been found out that remittance inflows helped in improving the standard of living in Turkish households. Furthermore, it has also been found out that those households who live in urban areas spend most of their daily expenses through remittance inflows.

Since most of the past studies in the context of Turkish economy posts a positive impact of remittance inflows on different economic indicators. Hence the question arises: what if we knew in advance the remittance inflow would be in the future? Knowing remittance inflows in advance will provide a more realistic picture for economic policymakers as they develop Turkey's future remittance policies. Especially in a situation when Turkey is already passing through one of the toughest times in its economic history. By the end of August 2022, inflation had breached all past records in 24 years by reaching a peak of 80.21 percent (Daren Butler and Canan Sevgili, 2022). Furthermore, as gold imports increased while tourism receipts and exports decreased, the current account deficit reached USD 36.7 billion, or 5.1 percent of GDP, by the end of 2020 (Tuba Sahin, 2021). The forex reserves also fell because the Turkish Republic Central Bank financed up to 80 percent of the current account deficit. Moreover, the second wave of COVID-19 exploded at the end of 2020, with daily cases surpassing 30,000 in the month of November (Julia Hahn, 2020), which eventually resulted in the further degradation of economy (World Bank, 2022b).

Not only this, in an effort to provide additional aid to safeguard the economic and social outcomes caused by the pandemic, the comprehensive national deficit is anticipated to be 3.5 percent of GDP in 2021, before reducing to 3.1 percent in 2022 and 2.6 percent in 2023 (World Bank, 2021). Poverty levels could rise by 2.1 percent by 2020, resulting in 1.6 million more people living in poverty and scarcity (World Bank, 2022a). Like the recession of 2018–2019, this current tragedy has a depressing effect on society. The World Bank has also pointed out that the government needs to take swift action to mitigate the social effects of COVID-19, or else poverty will quadruple. The poverty rate in Turkey is predicted to rise to its highest level in 2021 (World Bank, 2022a). Therefore, in order to effectively alleviate poverty, it will be necessary to implement control packets of social transfers, comprehensive job creation, and worker activation activities to

guarantee that benefits reach informal and unskilled workers, as well as other marginalized communities in which remittance inflows can play a crucial role (World Bank, 2021). Since Turkey is currently facing all these issues which are showing a bleak picture in the future for the economy. Hence, the question arises whether remittance inflows can be one such variable that can help revive the economy?

Since remittance inflows to Turkey were historically higher but are currently trending downward, the country is experiencing economic hardship. The economy's long-term objectives may be jeopardized if remittances continue to fall. As a consequence of this, it is of the utmost importance that decision-makers obtain advanced notice of forthcoming remittance inflows to the nation. This will enable them to take prompt action to mitigate the potentially negative effects of a decline in remittances and to devise a policy that can boost remittances sent from around the world.

Within this framework, the current research adds at least three new insights into the existing literature. Primarily, by forecasting remittance inflows, economic policymakers will be able to channel remittance funds into sectors that can help improve economic growth. Second, this forecast can help monetary policymakers plan their forex reserves ahead of time. Lastly, this prior anticipation can enable the economy to achieve its sustainable development goals. Taking this into account, the current analysis is the very first inference for the Turkish economy that attempts to predict the future trend of remittance inflows. Thus, the research question is as follows:

RQ: Are the remittance inflows to the Turkish economy resilient?

The remainder of the study is structured as follows: The review of literature is summarized in Section 2, the theoretical framework, data, and econometric methodology are discussed in Section 3, the results are shared and discussed in Section 4, and Section 5 concludes the research study.

2. Literature review

It is well known that remittances are a substantial source of overseas funds in emerging economies due to inadequate savings by individuals for their investments. Even during the COVID-19 crisis, the remittance inflows have maintained their persistency and resilience, declining less than forecast in 2020. The officially registered remittance movements to low- and middle-income nations totaled USD 540 billion in 2020, a meager 1.6 percent decrease from the previous year's sum of USD 548 billion. Furthermore, the drop in remittances reported in the year 2020 was not greater than that witnessed during the global economic crisis of 2009 (4.8 percent). Furthermore, it was significantly less than the deteriorating foreign direct investment flows to low- and medium-income countries (World Bank press release, 2021).

The resiliency of remittance inflows is primarily influenced by the factors that contribute the most to it. As and when these factors get affected, then the remittance inflows also get affected. According to the literature, there are two distinct classes of factors that influence worker remittances. The core category centers on the economic status of immigrants and their offspring. The other set of variables includes factors like the macroeconomic condition, the political situation, and the structure of an economy (Buch and Kuckulenz, 2010; Ratha, 2003). Taking these factors into account, one such study, which was based on

primary data from 84 households in Bangladesh, found that years of living abroad, altruism, and the exchange rate are the major factors affecting remittance inflows (Kumar et al., 2018). In a study of qualitative data analysis, it was found out that the fear of sudden interruption of remittance channels, conflict in the region, and the chances of repatriation are the major causes that affect remittance inflows (Vargas-Silva, 2016). A research study that was done in Pakistan for 1972–2012 highlighted that inflation negatively affects remittance inflows while financial liberalization has a positive effect on remittance inflows (Abbas et al., 2017). Vacaflores, (2018) in his study of 18 Latin American countries for 1995–2015, found that external forces are the major factors affecting the remittance inflows. Su and Dé, (2021) in their study of factors affecting remittance during a typhoon in the Philippines, found that the socio-economic class of the migrants, their culture, and their income were the major factors that affected remittance inflows. In a survey-based study of 3800 households in the United States, it was indicated that higher household income among migrants is the major driver of remittance outflows (Simpson and Sparber, 2019).

In their study of determining the macroeconomic indicators of remittance drivers in India, Jijin et al., (2022) discovered that exchange rate, oil price, and GDP growth are the major factors, while altruism also plays an important role. In their study of Egypt from 1980 to 2015, Akçay and Karasoy, (2019), discovered that currency depreciation, international oil prices, and GDP growth are the major drivers of remittance inflows. Similar results were also found by Qutb, (2019) during her study of Egypt for the period of 1980–2018. In an interesting study of two villages in India, Mazumder, (2018), has highlighted that low-skill migrants tend to send less remittance as compared to their high-skill counterparts. Another fascinating investigation was done by Gutierrez, (2018), in his study of second-generation Mexican and Filipino Americans, he concluded that socializing in the parental home during their childhood has a profound effect on remittance behavior. Similarly, social connection in the home country also positively affects remittances. While examining the macroeconomic determinants of remittance in Pakistan, Khalid Mustafa and Syed Rashid Ali, (2018) have taken a bilateral remittance dataset over the period of 2002–2013 and concluded that it is the economic performance of the home country that decides the amount of remittance that will be received, as it is mainly linked with investment opportunities available in the country. Aydas et al., (2014b), in their study of determining the factors contributing to remittance inflows to Turkey for 1979–1993, have concluded that economic growth, political stability, inflation, and the interest rate differential are required to be kept in check to have stable remittance inflows. Ajide and Alimi, (2018) in their study of 22 sub-Saharan African countries for 1994–2015, found that political instability is one of the major factors that affect remittance inflows. However, they also concluded that remittances themselves cannot resolve the issues created by political instability.

Furthermore, Poonam Gupta, (2006) in her study of remittance inflows to India, has found that the earning level of the migrants, the percentage increase in the number of migrants, and the economic performance of the home country are the major determinants that determine the number of remittance inflows. A survey-based study that was done by Havolli, (2009) observed that investment motives and the business environment are the deciding factors that attract remittance inflows. As a result, it was determined that economic policymakers should work to create a business-friendly environment in the country. In their study of 76 low- and middle-income developing countries, Adams, (2009) concluded that highly skilled migrants remit a lower amount than low-income migrants because high-income migrants bring their families with them to the host country. While it has also been discovered that the availability of a high-interest rate and investment opportunities attract highly skilled migrants to remit more. In the case of Nigeria, a study conducted by Laniran and Adeniyi, (2015) using a dataset from 1980 to 2013 concluded that the portfolio

investment motive plays a larger role as a remittance inflow driver than any other macroeconomic factor. By taking a bilateral remittance panel dataset of 17 Western European and 7 European Union countries, Schiopu and Siegfried, (2006) have investigated the impact of altruism and investment on remittance inflows. The study concluded that it is altruism that plays a major role in remittance inflows, not investment motives. Furthermore, the study has also concluded that the high skill level of migrants enhances the remittance movement. Moussir and Tabit, (2016) discovered that inflation, economic growth in the home and host countries, and financial development are the major determinants of remittance inflows in their study of 22 developing countries using a dataset from 1990 to 2014. Furthermore, in a study of India by Khan, (2023) it has been found that any positive shock in remittance inflows has a positive effect on economic growth. In an interesting study of 93 countries, Jackman, (2013), has searched for the factors that cause volatility in remittance inflows. The findings of the study indicated that interest rate and exchange rate volatility and economic shocks in the home country were the major factors that caused volatility in the remittance inflows.

Singh et al., (2011), in their study of 36 sub-Saharan African countries for which they have taken a dataset over the period of 1990–2005, have concluded that it is the size and location of the migrants that decide the inflow of remittance. Moreover, the study has also highlighted that if the migrants are located in rich countries, then their remittance inflows act as shock absorbers during tough economic situations. Another fascinating piece of research was done by El-Sakka and McNabb, (1999) in their study of Egypt by taking a dataset over the period of 1967–1991. The authors discovered that the currency exchange rate and interest rate are the two most important factors influencing remittance inflows. Because of the availability of non-competitive exchange and interest rates, money is transferred through the black market.

Although, there is very limited literature available on the determinants of remittance inflows to Turkey. In one of the very famous studies that was done by Straubhaar, (1986) has taken a dataset over the period of 1963 – 1982 and analyzed the factor that affects the remittance to Turkey. The results were quite astonishing as he found that it is neither the exchange rate nor the higher return on investments that attracts Turkish migrants to remit more, rather it is the political stability and the stability of return on investment that plays a major role. In another study for Turkey by Alper and Neyapti, (2014) by taking a dataset of 1992-2003, the authors found that low inflation, a high interest rate, a healthy exchange rate, and a stable economic condition are some of the factors that enhance remittance inflows to the economy. Köksal, (2006), in his study of the Turkish economy over the period of 1961-2004 found that apart from macroeconomic factors, it is the financial infrastructure in the home country that attracts remittance inflows. Ulku, (2012) in his survey-based study of 589 Turkish migrants in Berlin, has found that those migrants who have an intention of returning to their home country send more money than those who do not intend to return. On the other hand, those who do not intend to return to their home country send money mainly to fulfill the family's requirements. Akkoyunlu and Kholodilin, (2006) conducted a study on Turkish migrants in Germany by taking a dataset over the period of 1962-2004 and concluded that it is the economic condition in the host country that determines the remittance inflows to Turkey. They have also recommended that Turkish economic policymakers keep an eye on the economic conditions in Germany to predict future remittance inflows.

These all-literature findings mostly highlight that political stability, altruism, social connection, GDP growth of an economy, currency exchange rate, availability of investment opportunities, control of inflation, and the skill level of the migrants are the major factors that contribute to the enhancement of remittance inflows. The interesting fact is that all of these factors can be controlled at a national level, up to a certain

extent, if related policies are put in place with a specific agenda. Furthermore, other factors such as the host country's economic condition and political stability can provide insight into future remittance inflows by taking the concentration of migrants in those countries into account. Lastly, global oil prices, political instability in other parts of the world, and the cost of living in host countries are some of the factors that are mainly out of the control of a particular economy.

There are many distinct characteristics and reasons that generate remittance inflows to the host country, and the literature is abundant with varied examples of both. Therefore, it is reasonable to believe that remittances have the potential to contribute positively to the economic expansion of the Turkish economy. However, no study is currently available that captures the forecast of remittance inflows, which would allow economic policymakers to prepare themselves in advance so that preventative actions could be taken. To bridge this gap, the current study is the very first inference for the Turkish economy that seeks to forecast the future trajectory of remittance inflows.

3. Data and methodology

Remittances are those financial resources that support economies with insufficient funds (Huseyin Karamelikli and Yılmaz Bayar, 2015). In this research, time series data for the period of 1974–2021 has been used, and the data has been collected from the World Bank website (World Bank, 2021a). Moreover, remittance inflows are depicted as a percentage of GDP, while the autoregressive integrated moving average (ARIMA) methodology has been used to forecast the remittance inflows from the years 2022 - 2030.

The ARIMA methodology that has been applied in this study is a statistical method for decomposing and predicting time series data by modeling the correlations in the data. The ARIMA methodology has some advantages in real-world applications, particularly for short-term prediction (Box and Jenkins, 1970). Furthermore, the ARIMA method only requires prior data from a time series to generalize the forecast. As a result, the ARIMA method can improve forecast accuracy while retaining the number of parameters to a minimum.

The ARIMA methodology is made up of three components, which are AR, I, and MA. The AR (autoregressive) component takes the past value of the selected variable, whose future values are required to be forecasted. The MA (moving average) component accounts for the past values of the error term. The I (integration) element describes the stationarity level of the selected variable (Crawford and Fratanoni, 2003). If the chosen variable is stationary at level, the ARMA model is used; if the chosen variable is stationary at the first difference, the ARIMA model is used.

The ARIMA model is also known as the ARIMA (p, d, q) model or simply AR (p), d, and MA (q). In the below-mentioned equation 1, the variable "y" denotes the dependent variable whose value is required to be forecasted. While the letter "p" denotes the past value used for the AR (autoregressive) component up to the pth extent, while μ_t represents the error term, it has a constant variance, a zero mean, and a white noise error term.

$$y_t = \mu + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \phi_3 y_{t-3} + \dots + \phi_p y_{t-p} + \mu_t = \mu + \sum \phi_i y_{t-p} + \mu_t \quad (1)$$

In the below-mentioned equation 2, the variable "y" denotes the dependent variable whose value is required to be forecasted. while the letter "q" denotes the linear combination of past error values for the MA (moving average) component up to the qth extent. Since it is a linear combination of past error values, we can simply assume that the MA (q) process is stationary. The MA (q) process could be expressed as follows:

$$y_t = u_t + \theta_1 u_{t-1} + \theta_2 u_{t-2} + \theta_3 u_{t-3} + \dots + \theta_q u_{t-q} = u_t + \sum \theta_i u_{t-i} \quad (2)$$

Equation 3 denotes the combination of results related to equations 1 and 2. It is as follows:

$$y_t = \mu + \varphi_1 y_{t-1} + \varphi_2 y_{t-2} + \varphi_3 y_{t-3} + \dots + \varphi_p y_{t-p} + u_t + \theta_1 u_{t-1} + \theta_2 u_{t-2} + \theta_3 u_{t-3} + \dots + \theta_q u_{t-q} \quad (3)$$

3.1 Steps of ARIMA model

As a starting point of the process, it is required to check the stationarity level of the selected variable. If the variable becomes stationary at level, then the ARMA model is applied. The ARIMA model is used if the variable becomes stationary after taking the first difference. Once the stationarity level is confirmed, the second step is to determine the order of AR (p), integration (d), and MA (q). To fulfill this requirement, it is required to plot the values of the autocorrelation function (ACF), which captures the MA (q) term, and the partial autocorrelation function (PACF), which captures the AR (p) term. These are generated with the help of a correlogram. Those correlograms that cross the boundary limit of the ACF and PACF functions are taken into consideration, and they form different combinations of ARIMA models. Since there can be different ARIMA models available, it is required to select the best model among all available models that can be used for forecasting. The model is chosen by looking for the model with the highest R square value and the lowest information criterion value based on the AIC and SIC information criterion.

Once the best-suited model has been finalized, the next step is to use the selected model for forecasting. Furthermore, to ensure that the selected model has a strong predictive ability, it is required to apply a few diagnostic tests. Firstly, the Ljung-Box diagnostic test is applied to ensure that there are no autocorrelations in the errors. The null hypothesis is that there is no autocorrelation in the errors, while the alternate hypothesis indicates that there is an autocorrelation in the errors. If the p-value is greater than 5 percent, then it's a confirmation that there is no autocorrelation in the errors (Ljung and Box, 1978a).

Subsequently, we check to ensure that the ARIMA process is invertible, and the covariance is stationary. It is confirmed by checking that AR and MA roots should be within the unit circle. Once these diagnostic tests are satisfied, we move ahead with the forecasting process by selecting the best fitting ARIMA model.

4. Results and discussion

4.1 Unit root test

As an initial step, it is required to check the stationarity level of the selected variable. This requirement has been fulfilled by applying the augmented Dickey-Fuller unit root test (Dickey and Fuller, 1981).

Table 1. Unit Root Test

Variable	At Level & Intercept			At Level & trend and intercept		
	t-Stats	Prob.*	Result	t-Stats	Prob.*	Result
At Level & Intercept	-1.4654	0.542	Non-Stationary	-5.089	0.0001	Stationary
At Level & trend and intercept	-3.0701	0.1253		-4.8935	0.0016	

Source: Authors computation via Eviews10

According to Table 1, remittance inflow time series data is non-stationary at both the level and intercept and the level, trend, and intercept. However, after checking for stationarity after taking the first difference, the series becomes stationary at both the level and intercept, as well as the level, trend, and intercept. With this outcome, it has been concluded that the ARIMA model is best suited for this analysis.

4.2 Correlogram generation:

The next step is the generation of a correlogram to find the values of autocorrelation and partial autocorrelation. The values of AC (autocorrelation) depict the MA term, while PAC (partial autocorrelation) depicts the AR term. All those bars that cross the dotted line form the basis for finding the probable combination of ARIMA models. The use of correlograms is very common when formulating ARIMA models. For instance, Benvenuto et al., (2020) have also used correlograms while modeling the ARIMA model in their research on forecasting the COVID-19 virus spread. As per Figure 1, it has been discovered that there can be four possible ARIMA model configurations, which are as follows: AR (4) MA (4), AR (4) MA (6), AR (6) MA (6), and AR (6) MA (4).

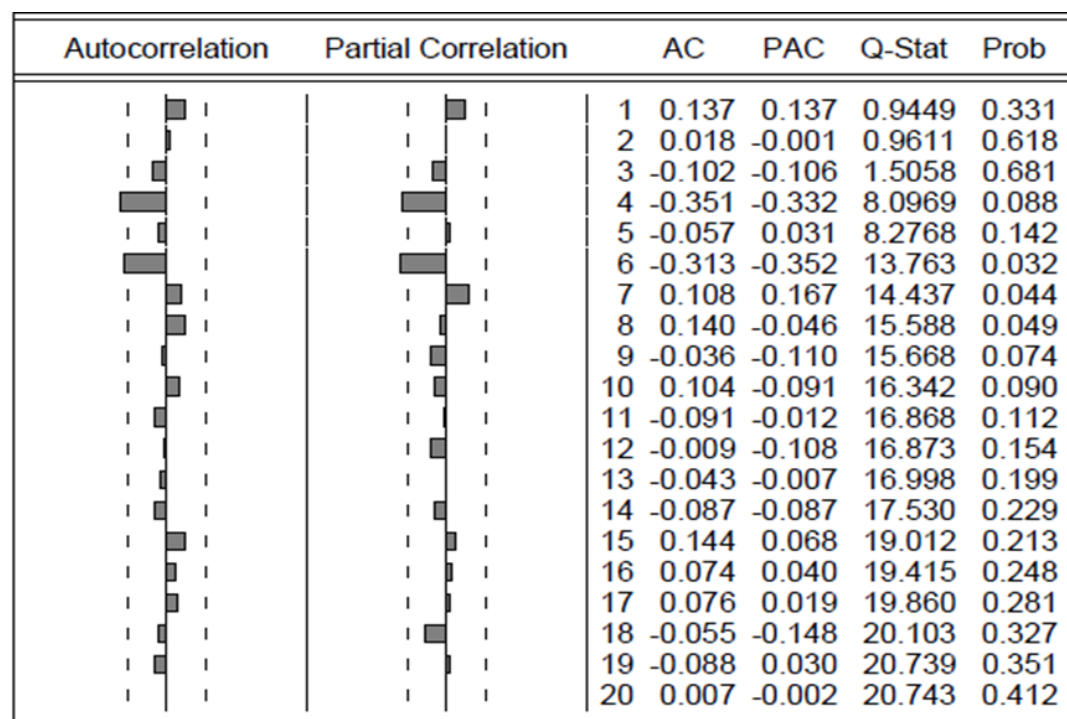


Fig. 1: Correlogram

Source: Authors computation via Eviews10 software

4.3 ARIMA model selection:

The third step is analyzing all four potential ARIMA models and selecting the one that is best suited to be used for forecasting. The parameters to analyze the viability of the model include the model that has the maximum R square and adjusted R square values, significant F-statistics values, and the lowest AIC, SIC, and HQ values. On analyzing these parameters in Table 2, the most preferred model was found to be Model: 2 AR (4) MA (6), as it has the highest R-squared and adjusted R-square values of 0.5633 and 0.5388, respectively, a significant F-statistics value of 0.0000, and the lowest values for the AIC, SIC, and HQ information criteria, which are 0.6859, 0.8434, and 0.7452, respectively, in comparison to other models. Finally, Model: 2 AR (4), MA (6) has been chosen for forecasting.

Table 2: ARIMA model selection

Model	Variable	Coefficient	Std. Error	t-Statistic	Prob.
Model: 1 AR(4) MA(4)	C	-0.069919	0.044821	-1.559965	0.1261
	AR(4)	-0.5763	0.345193	-1.669499	0.1023
	MA(4)	0.174226	0.493488	0.353051	0.7258
	SIGMASQ	0.136612	0.020407	6.694246	0.0000
	R-squared	0.170072		AIC	1.036449
	Adjusted R-squared	0.11217		SIC	1.193908
	Prob(F-statistic)	0.043855		HQ	1.095702
Model: 2 AR(4) MA(6)	C	-0.079212	0.016578	-4.778127	0.0000
	AR(4)	-0.502552	0.087794	-5.724232	0.0000
	MA(6)	-0.999979	2689.389	-0.000372	0.9997
	SIGMASQ	0.071877	110.7424	0.000649	0.9995
	R-squared	0.563344		AIC	0.685969
	Adjusted R-squared	0.53288		SIC	0.843428
	Prob(F-statistic)	0.0000		HQ	0.745222
Model: 3 AR(6) MA(4)	C	-0.077959	0.023009	-3.388251	0.0015
	AR(6)	-0.633683	0.089706	-7.064012	0.0000
	MA(4)	-0.511803	0.149907	-3.414141	0.0014
	SIGMASQ	0.102883	0.017949	5.732077	0.0000
	R-squared	0.374979		AIC	0.820613
	Adjusted R-squared	0.331373		SIC	0.978072
	Prob(F-statistic)	0.000138		HQ	0.879866
Model: 4 AR(6) MA(6)	C	-0.084937	0.034612	-2.453949	0.0183
	AR(6)	0.153409	0.331341	0.462994	0.6457
	MA(6)	-1	6305.294	-0.000159	0.9999
	SIGMASQ	0.098893	312.4489	0.000317	0.9997
	R-squared	0.399222		AIC	0.938023
	Adjusted R-squared	0.357307		SIC	1.095482
	Prob(F-statistic)	0.000061		HQ	0.997276

Source : Authors calculation via Eviews10 software

4.4 Forecasting:

Forecasting is the penultimate requirement of the ARIMA model. According to Figure 2, remittance inflows to Turkey are expected to fall further in the coming years. In the year 1974, remittance inflows represented 3.99 percent of Turkish GDP, but it is forecast that they will fall to a level of -1.029 percent of GDP by the end of the year 2030. Moreover, Table 3 indicates the details of remittance inflows as a percentage of GDP across the years 1974–2030. This decline in remittance inflows raises several questions

about the performance of the economy in the upcoming years. It's been mentioned by de Lucia et al., (2021) that in Turkey, remittance inflows and economic growth go hand in hand, and both of these factors positively affect each other. Similarly, Buhari Doğan and Muhlis Can, (2018) have found in their study of the Turkish economy that remittance inflows positively affect the economic growth of Turkey in both the short and long term. Hence, if the remittance inflows decline, there is more of a chance that it will negatively affect economic growth. One of the reasons for this decline can be attributed to the increase in the number of migrants in Turkey. By the end of December 2021, it was reported that a total of approximately 5 million migrants lived in Turkey (United Nations, 2021). In the year 2019, Turkey has received 24 percent more migrants compared to the year 2018. During the same period, however, only 2 percent of emigrants from Turkey to OECD countries increased. This imbalance has further impacted the remittance movement (OECD, 2021). Secondly, the existing literature also highlights that remittance inflow leads to appreciation in the exchange rate, which is generally called "Dutch disease" (Hien et al., 2020). However, in the case of Turkey, the remittance inflow has declined, and it is expected that the remittance inflow will continue to decline, which is an alarming sign highlighting the fact that the Turkish Lira's value may depreciate due to lower remittance inflows. Not only this, but the depreciation in currency value makes imports expensive and brings inflation to the economy (Kibritçioğlu, 2001). According to Reuters, inflation has reached a 24-year high, peaking at 83.45 percent in September 2022 (Murad Sezer, 2022). Hence, in conclusion, we might assume that if remittance inflows can be enhanced, then the current imbalances in the economy can be brought back on track.

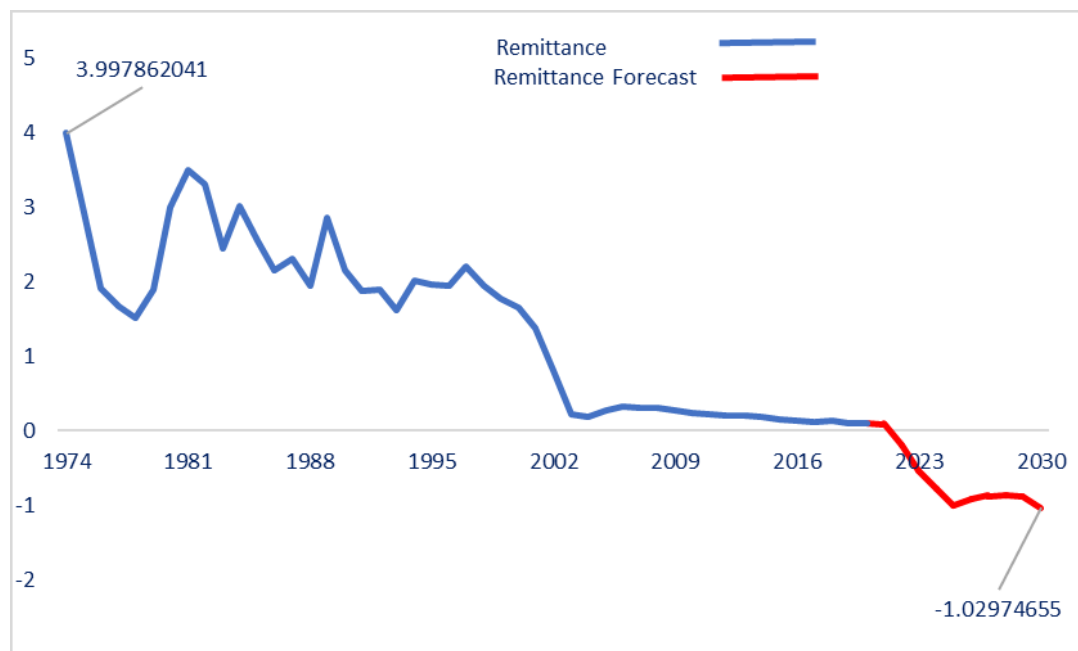


Fig. 2: Remittance forecast
 Source: Authors computation via Eviews10 software

Table 3. Remittance Forecast (% of the GDP)

Year	Remittance (% of GDP)
1974	3.997862041
1975	2.930933913
1976	1.920578231
1977	1.673388242
1978	1.510013275
1979	1.89638242
1980	3.009138531
1981	3.505066574
1982	3.315447857
1983	2.45305154
1984	3.012173241
1985	2.549269456
1986	2.157722091
1987	2.318383995
1988	1.954810117
1989	2.858786885
1990	2.154287165
1991	1.878984677
1992	1.898281274
1993	1.620138908
1994	2.010097587
1995	1.962994676
1996	1.95177802
1997	2.210871419
1998	1.940808993
1999	1.768040531
2000	1.662395483
2001	1.380909116
2002	0.805816476
2003	0.2317284
2004	0.196636613

2005	0.270191101
2006	0.329050218
2007	0.307630287
2008	0.316563245
2009	0.282469965
2010	0.234107764
2011	0.224497331
2012	0.213614943
2013	0.198479192
2014	0.185206362
2015	0.161399178
2016	0.136369967
2017	0.122002859
2018	0.144128516
2019	0.106438277
2020	0.110423595
2021	0.108423595
2022	-0.188166453
2023	-0.540811175
2024	-0.778075311
2025	-0.992647418
2026	-0.916080111
2027	-0.861279627
2028	-0.861061721
2029	-0.872247747
2030	-1.02974655

Source: Authors computation via Eviews10 software

4.5 Diagnostic Test:

Test 1: Correlogram Q Statistics test - The first diagnostic test is to ensure that the selected ARIMA model exhibits a stable univariate process. The Ljung-Box Q statistics test with the null hypothesis that the residuals are white noise has been applied (Ljung and Box, 1978b). Figure 3 shows that neither in autocorrelation nor in partial correlation do any values cross the dotted lines. Moreover, the p-values at all the lags are greater than the 5 percent level of significance, which indicates that the null hypothesis is accepted as the residuals are white noise.

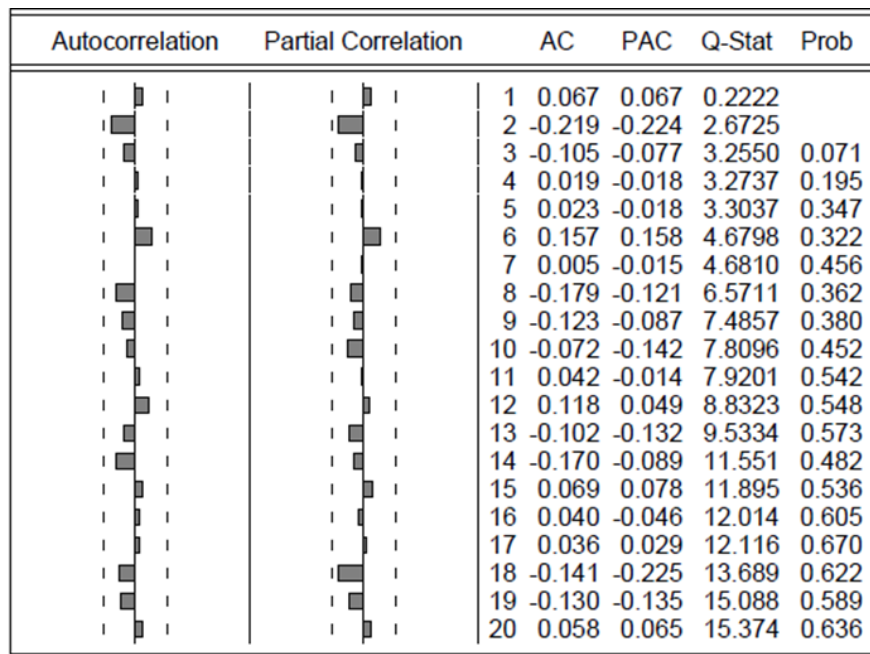


Fig. 3: Correlogram Q statistics diagnostic test
 Source: Authors computation via Eviews10 software

Test 2: ARMA process for (covariance) stationarity and invertibility - Another investigative test is to determine whether the predicted ARMA process is stationary (covariance), which requires that the AR roots be located within the unit circle. As shown in Figure 4, all of the white color dots are contained within the circles, signifying that the ARMA method is covariance stationary. Lastly, make sure that the estimated ARMA process is invertible, which denotes that all MA roots should be confined within the unit circle. As demonstrated in Figure 4, all red-colored dots are enclosed inside the circle, suggesting the invertibility of the ARMA process.

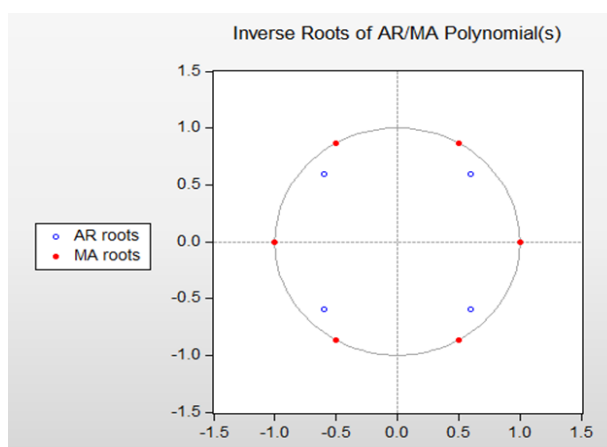


Fig. 4: Remittance forecast
 Source: Authors computation via Eviews10 software

5. Conclusion and policy recommendation

The relevance of remittance inflows to different economic parameters has always attracted policymakers, and it is well recognized in existing literature. However, the majority of studies empirically examine the impact of remittances on various parameters and draw conclusions about their effect on those parameters. This eventually helps policymakers and the relevant governments to devise the policies accordingly. But the question is whether this remittance inflow will continue to be received at the same rate in the future as it has in the past? This is the question that is mostly missing in the majority of the studies. Taking this into account, if we knew in advance what the future remittance inflows to the economy would be, it would be easier for policymakers to devise policies that would help different factors that could be affected by remittances in the future. To fulfil the requirement of forecasting future remittance inflows to the Turkish economy, this study has taken a dataset for the period of 1974–2021 and applied the autoregressive integrated moving average (ARIMA) technique to predict the remittance inflow for the period of 2022–2030. The results indicated a bleak picture of future remittances, as it was found that remittances will continue to decline and will reach a negative 1.02 percent of GDP by the end of the year 2030. Based on the findings of the study, we may conclude that if the remittance inflow continues to decline in the future, then it can have negative impacts on economic growth, financial development, poverty level, exchange rate, and so many other factors that are directly or indirectly related to remittances. Hence the following policies are recommended.

- The policymakers can provide relaxation in the KYC procedures taking in account the necessary compliance measures
- Preferential exchange rates can be offered to those who remit to the home country
- An infrastructure of investment can be created so that those households who receive remittance has the option of investing in different channels rather than keeping the funds in the bank account
- For those households who receive remittances above a certain limit can get the benefit of having loans on easier terms

6. Limitation and future work

As far as the limitations of the study are concerned, only remittance inflows are being taken as the major variable, and their forecast has been made. However, besides remittance inflows, other foreign sources of funds, including foreign direct investments and ODA, can also be a factor of interest for future research. Though we have these limitations, the current study has successfully managed to answer the framed research question.

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